Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

Sorting Category: 4.11.0 (E)

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ION BEAM DRIVEN WARM DENSE MATTER EXPERIMENTS[1] F. M. BIENIOSEK, E. HENESTROZA, M. A. LEITNER, S. M. LIDIA, B. G. LOGAN, R. M. MORE, P. A. NI, P. A. SEIDL, W. L. WALDRON, LBNL, J. J. BARNARD, LLNL — We report plans and initial experimental results in ion beam-driven warm dense matter (WDM) experiments. Initial experiments use a 0.3 MeV K+ beam from the NDCX-I accelerator. Future plans include target experiments using the NDCX-II accelerator, which is designed to heat targets at the Bragg peak using a 3-6 MeV Li+ ion beam. The WDM conditions are to be achieved by combined longitudinal and transverse neutralized drift compression to provide a hot spot on the target with a 1-mm beam spot size, and 2-ns pulse length. As a technique for heating matter to high energy density, intense ion beams are capable of delivering precise and uniform beam energy deposition dE/dx, in a relatively large sample size, and the ability to heat any solid-phase target material. The range of the beams in solid matter targets is less than 1 micron, which can be lengthened by using porous targets at reduced density. We have developed a WDM target chamber and a suite of target diagnostics including a fast multi-channel optical pyrometer, optical streak camera, VISAR, and high-speed gated cameras. Initial experiments will explore measurement of temperature and other target parameters. Future experiments are planned in areas such as dense electronegative targets, porous target homogenization and two-phase equation of state.

[1]This work was performed under U.S. DOE Contracts No. DE-AC02-05CH11231 and DE-AC52-07NA27344

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Date submitted: 10 Jul 2008 Electronic form version 1.4